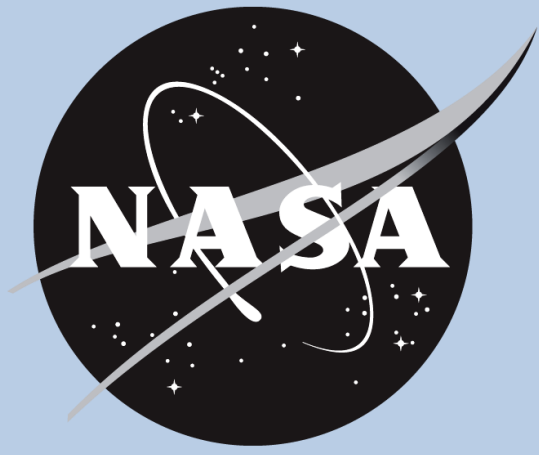


Lightning Protection and Structural Bonding for the B2 Test Stand



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With the privatization of the space industry, NASA has entered a new era. To explore deeper parts of the solar system, NASA is developing a new spacecraft, the Space Launch System (SLS), capable of reaching these destinations, such as an asteroid or Mars. However, the test stand that is capable of testing the stage has been unused for many years. In addition to the updating/repair of the stand, more steel is being added to fully support the SLS. With all these modifications, the lightning protection system must be brought up to code to assure the protection of all personnel and assets. Structural bonding is a part of the lightning protection system. The focus of this project was to assure proper structural bonding. To begin, all relevant technical standards and the construction specifications were reviewed. This included both the specifications for the lightning protection and for general construction. The drawings were reviewed as well. From the drawings, bolted structural joints were reviewed to determine whether bonding was necessary. Several bolted joints were determined to need bonding according to the notes in the drawings. This exceeds the industry standards. The bolted joints are an electrically continuous joint. During tests, the stand experiences heavy vibration that may weaken the continuity of the bolted joint. Therefore, the secondary bonding is implemented to ensure that the structural joint has low resistance. If the structural joint has a high resistance because of corrosion, a potential gradient can occur that can cause a side flash. Damage, injury, or death can occur from a side flash so they are to be prevented. A list of the identified structural joints was compiled and sent to the contractor to be bonded. That covers the scope of this project.

Introduction

This project seeks to determine the requirements for the structural grounding of the B2 test stand which is currently undergoing renovation and new construction and to identify bolted structural joints that need bonding across the joint. This project is being done to

- Ensure safety of all personnel on the stand
- Ensure safety of all assets on the stand
- Comply with relevant codes and standards
- Minimize the potential for side flashes by equalizing the potential of major structural members
- Ensure NASA's design is accurately followed.

Objectives

The objectives of this project are to

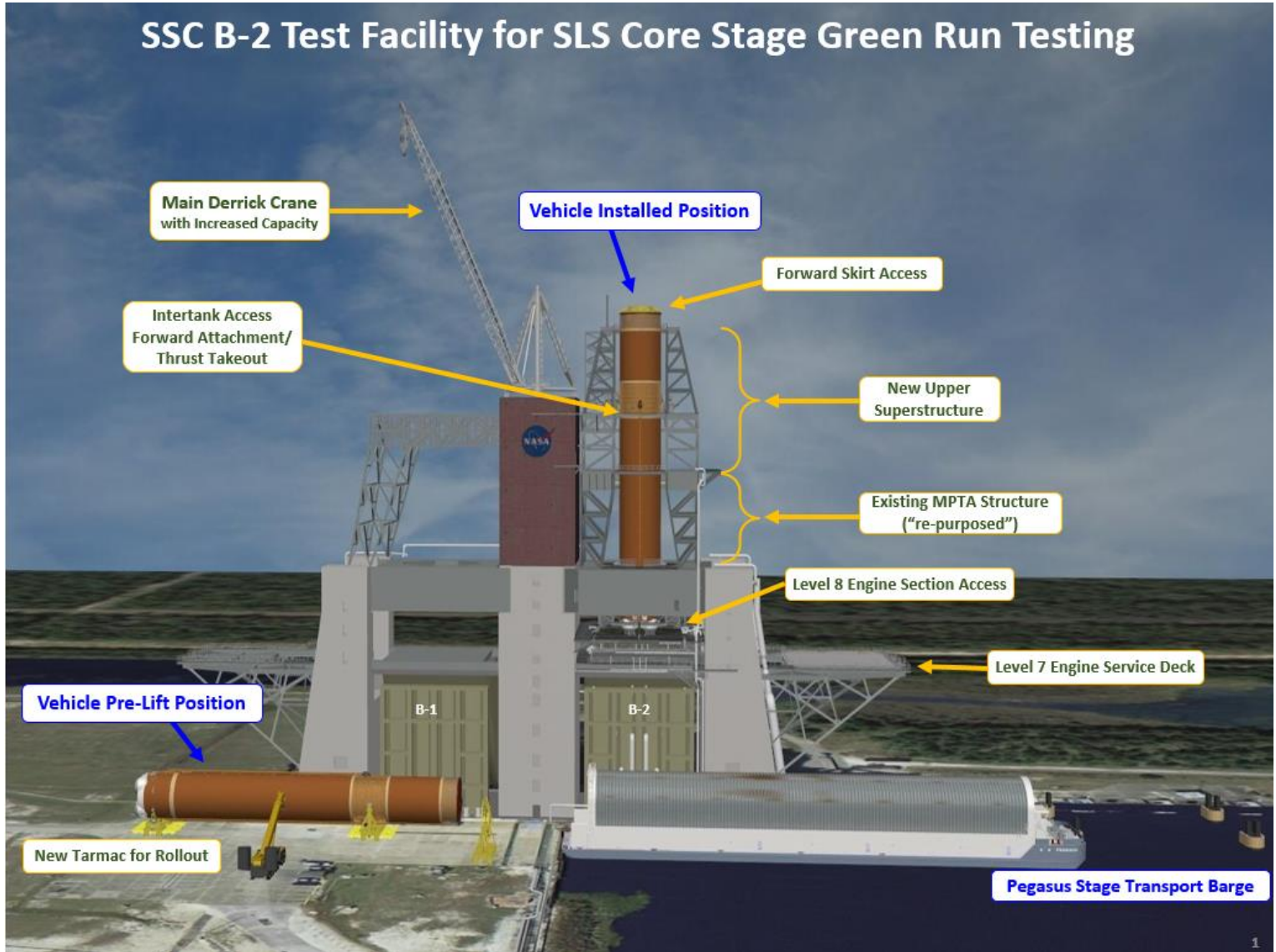
- Develop justifications for any additional bonding
- Identify structural joints that need bonding
- Develop a list of identified structural joints that will be sent to the contractor
- Identify on the drawings the joints that need additional bonding and send these to the contractor
- Assure that additional bonding follows the specifications.

Outcomes

- This project will result in a transmittal and/or an engineering modification with the list of structural joints that need to be bonded.
- The construction process will be monitored if time permits.
- Bolted members will be bonded across the joint.
- Welded members will need no additional bonding.
- The structure and assets will be protected from side flashes originating from a lightning strike.

Summary

The project identified bolted joints that need to be bonded across the joint. This additional bonding is per the notes of the drawing. This note exceeds the standards such as NFPA 780, KSC-STD-E-0012F, or SSTD-8070-0081-ELEC-C-1. The additional bonding serves as extra protection in case the heavy vibration from the stand causes a high resistance in the joint. The high resistance could result in a dangerous side flash that can cause injury, death, or damage to assets or structures.



B2 Test Stand with Renovations



Bolted and Un-bonded Joint



Bolted and Bonded Joint



Welded Joint

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